Title: Running Into Statistics

Brief Overview:

Since the 1996 Olympics took place close to home, they were a major topic of discussion all over the region. Students have traditionally been interested in sports and therefore it seems logical to relate sports to math to interest the students. In this activity, students will collect Olympic statistics from a timed event of their choice and determine various statistics.

Link to Standards:

- **Problem Solving** Students will use past Olympic statistics and mathematics to predict the most recent Olympic statistics.
- **Communications** Students will effectively communicate trends and patterns in Olympic statistics.
- **Reasoning** Students will make conjectures about the most recent Olympics statistics and then determine accuracy of these statistics.
- **Algebra** Students will use linear equations to determine the median-median line.
- **Statistics** Students will collect data and analyze it by determining mean, mode, and median. Students will also use data to create histograms and scatter plots and then draw inferences based on this data.

Grade/Level:

Grades 9-12 : Fast Math, General Math, Consumer Math, Basic Algebra, Algebra I, Algebra-Geometry, Algebra II

Duration/Length:

This activity will take 2-3 block periods or 3-4 fifty minute periods.

Prerequisite Knowledge:

Students should have a working knowledge of the following:

- TI-82 graphics calculator
- The Internet
- Reading and interpreting data accurately

- Plotting points on a coordinate plane
- Determining measures of central tendency

Objectives:

Students will:

- work cooperatively in groups.
- collect and organize data from resources.
- further develop proficiency with TI-82 graphics calculator.
- evaluate a situation and give appropriate support for their answer.
- determine mean, mode, and median.
- create histograms, scatter plots and stem leaf plots.
- effectively use written and oral communication.

Materials/Resources/Printed Materials:

- Current almanac
- Pencils
- Paper
- TI-82 Graphics Calculator
- Student worksheets
- Internet

Development/Procedures:

- Familiarize students with the statistics key functions on the TI-82 graphics calculator. Starting with the Shoe Size vs. Height Worksheet, students will collect their shoe sizes and heights and record them in the table. After clearing lists in the calculator, enter this data into lists 1 and 2. Using the calculator, place data into ascending order, visually find the mode and median, and calculate the mean (using calculator's built in function only if the students have had sufficient experience in calculating means). Graph the data from lists 1 and 2 on a scatter plot. Once this is done, find the median-median line and graph it with the scatter plot. Students should then complete the worksheet.

- Have students choose a timed Olympic event (speed skating, track and field, swimming, or skiing). Using a current Almanac, record winning times for men and women in the event from 1936-1992 in the table on Olympic Data Worksheet. After clearing lists in the calculator enter this data in lists 1-4 (men in 1 and 2, women in 3 and 4).

- Calculate the mean, mode and median. Record these results on the Olympic Data Worksheet and interpret the results in the follow-up questions.

- Graph a histogram (with the calculator) for the men's times and a separate one for the women's times. Record this graph on Olympic Graphs Worksheet. Create a back-to-back stem-leaf plot of men's and women's times on the worksheet.

- Using the TI-82 graph a scatter plot of year versus time for both men and women separately. Calculate and graph the median-median line on the same plot. Record this on the Olympic Graphs Worksheet.

- Discuss observations of results (patterns and/or trends) in small groups. Complete Olympic Interpretation Worksheet. Make predictions about the 1996 winning times in the chosen events and record on the worksheet. Collect this actual data and enter this in the worksheet. Complete worksheet.

Evaluation:

The teacher will circulate around the room to observe students' work. Students will be evaluated in the areas of participation, accuracy of calculations, completion of assignments (worksheets), and proficiency in using the TI-82 graphics calculator.

Extension/Follow Up:

- Use the Internet to collect data.
- Use the graph link to record graphs.
- Create charts and/or graphs on poster board.
- Write a report on a record-breaker in a chosen event.
- Explain the origin of the median-median line.
- Apply the activity to school track team. Focus on how results could help team (would it help?). Discuss.

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SHOE SIZE VS. HEIGHT WORKSHEET

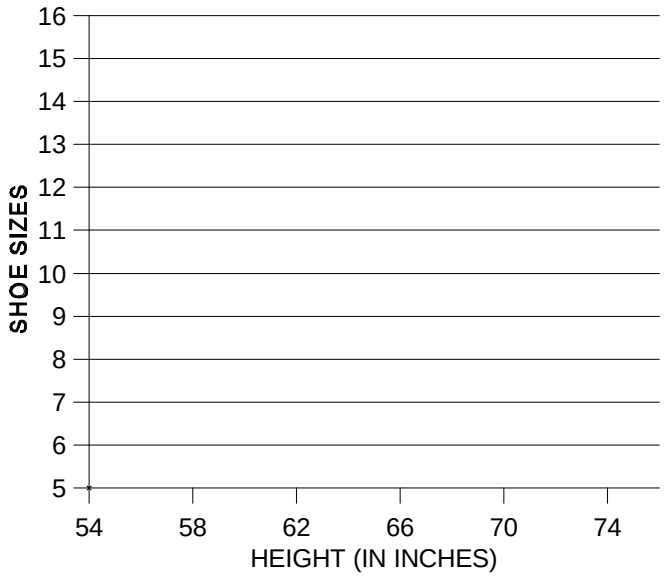
1. Enter the class' height and shoe size data here.

HEIGHT (IN INCHES)	SHOE SIZE (WOMEN'S: SUBTRACT 1.5)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	

2. Find the measures of central tendency and record here.

	HEIGHT	SHOE SIZE
MEAN		
MODE		
MEDIAN		

3. Create a scatter plot based on #1 below. Check for accuracy using the calculator. On the calculator, determine and insert the median-median line and record here.



4. Write the equation for the median-median line here: y= _____.

5. a. Substitute your height for x in the equation and round the shoe size to the nearest 0.5 _____.
b. What shoe size was predicted? _____ How close is this to your actual shoe size? _____.

6. According to the Guinness Book of World Records, the tallest person who ever lived was Robert Wadlow, who was 8 feet, 11 inches tall. What shoe size does your equation predict for him? _____

7. Do you think it would be reasonable to sell shoes by a person's height? Why or why not?

OLYMPIC DATA WORKSHEET

1. Insert times for your chosen event.

YEAR	MEN'S TIMES	WOMEN'S TIMES
1936		
1940		
1944		
1948		
1952		
1956		
1960		
1964		
1968		
1972		
1976		
1980		
1984		
1988		
1992		

2. Determine the measures of central tendency and record.

	MEN	WOMEN
MEAN		
MODE		
MEDIAN		

Follow-up Questions (could use these with shoe size vs. height data also):

3. Which measure of central tendency is the most appropriate to use? Why?

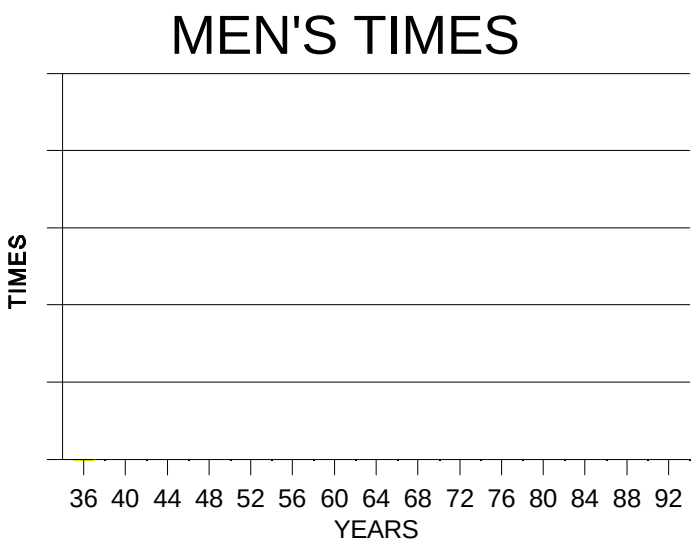
4. Is there a limit to how fast a human being can complete a race in your chosen event?

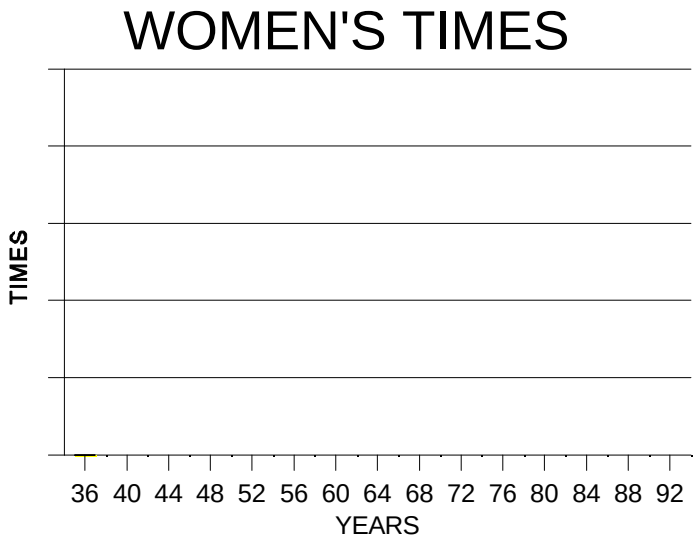
5. Dies the mean of data always exist? Explain your reasoning by looking at the effect of outliers on your mean value.

6. Can you give a situation that requires you to look at the mode or the median rather than the mean?

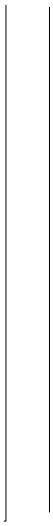
OLYMPIC GRAPHS WORKSHEET

1. Create a histogram for men's and women's times in your event.

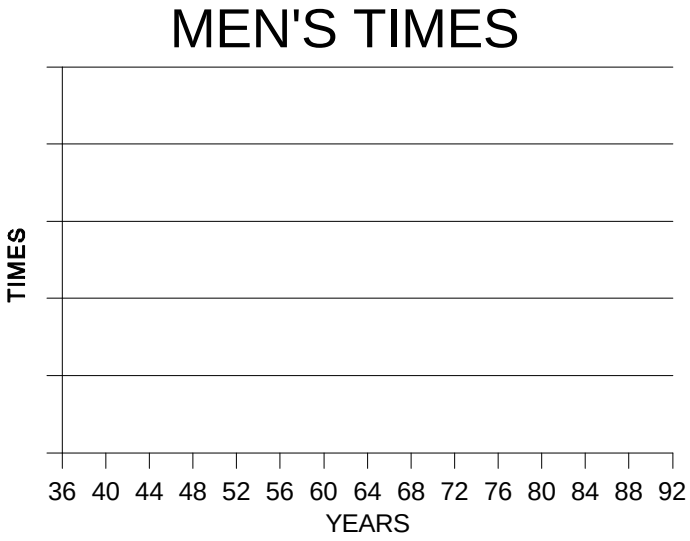


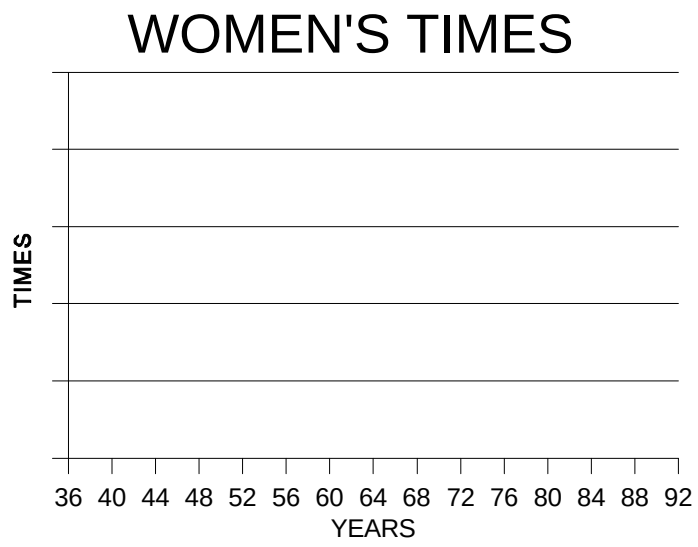


2. Create a back-to-back stem-leaf plot for men's and women's times for your event.



3. Graph a scatter plot for men's and women's times on the calculator. Record on the axes below. Graph the median-median line and record on the appropriate plot below.





4. Write the equation for the median-median line here:

MEN'S y=_____

WOMEN'S y=_____

OLYMPIC INTERPRETATION WORKSHEET

Answer the following questions using your Olympic Graphs Worksheet.

1. What trends or patterns do you notice in each scatter plot? Are they increasing or decreasing? Are there any outliers? Anything else you observe? Why do you think that is the case?

2. Compare the men's and women's times. What conclusions or conjectures can you make? Are they similar or different? Why do you think that is the case?

3. Using the equation for the median-median line, predict the winning times in the 1996 Olympics for your event (men and women).

4. Find the actual 1996 winning times and record here. Was your prediction close to the actual times? Why or why not?

5. Do you think you could predict results of future Olympics using your data? Why or why not? Think of external factors.